

Claims

1. Halogen-free composite film consisting of at least one to N sealable, multi-layered laminated film(s), wherein N is an integer from 2 to 10, and in which a functional layer and/or a functional element is present between the individual laminated films.
2. Composite film in accordance with claim 1, **characterized in that** the functional layer and/or element is a printed circuit board, a sensor, a metallic stranded wire or a metallic conductor material, in particular copper, silver, iron, nickel, aluminum, or alloys of these metals, or an electronic component.
3. Composite film in accordance with one of claims 1 or 2, **characterized in that** the sealable, multi-layered laminated films are each composed of a first film, a laminating adhesive or lacquer, a second film, and if applicable a thermally activated substance.
4. Composite film in accordance with one of claims 1 through 3, **characterized in that** the individual films of the sealable, multi-layered laminated films are identical to and/or different from one another.

5. Composite film in accordance with claim 3, **characterized in that** the second film of each laminated film can be equipped with a thermally activated substance.

6. Composite film in accordance with one of claims 1 through 5, **characterized in that** the first and the second film of the individual laminated films are selected from the group consisting of LCP (liquid crystal polymer), polyphenylene sulfide, polyethylene terephthalate, polyethylene naphthalate, polyketone, polyetherketone, polyetheretherketone, polyetherketoneketone, polyetheretherketoneketone, polyetherimide, polyether sulfone, polysulfone, cyclo-olefin copolymer, and polyamide films.

7. Composite film in accordance with one of claims 1 through 6, **characterized in that** the laminating adhesive or lacquer is selected from the group consisting of acrylates, polyurethanes, polyester polyols, polyester urethanes, epoxides, copolyesters or natural adhesive resins, which can be used as single-component or multi-component systems.

8. Composite film in accordance with one of claims 1 through 7, **characterized in that** the wet application weight of the laminating adhesive is 2 g/m^2 to 40 g/m^2 , preferably 4 g/m^2 to 10 g/m^2 .

9. Composite film in accordance with one of claims 1 through 8, **characterized in that** the thermally activated substance is selected from the group consisting of

cyclo-olefin copolymers, polyesters, polyurethanes, acrylates and derivatives thereof, vinyl acetate copolymers, polyvinyl alcohols, polyvinyl butyrals, polyvinyl acetates, sealable maleic resins, alkyd resins, polyolefins, polyamides and saturated, unsaturated, linear and/or branched copolyesters or multi-component polyurethane primer systems.

10. Composite film in accordance with one of claims 1 through 9, **characterized in that** the first and second films of the individual laminated films each have a thickness between 10 μm and 100 μm .
11. Composite film in accordance with one of claims 1 through 10, **characterized in that** the composite film can be used in a range from $-40\text{ }^{\circ}\text{C}$ to $140\text{ }^{\circ}\text{C}$.
12. Composite film in accordance with one of claims 1 through 11, **characterized in that** it is halogen-free, resistant to chemicals, has good mechanical properties, in particular high tensile strength and elongation at break, has excellent flame-resistant properties, excellent resistance to hydrolysis, low shrinkage, and can be used at high long-term service temperatures of $140\text{ }^{\circ}\text{C}$ and above.
13. Process for manufacturing a composite film, **characterized in that** a laminating adhesive is applied to the first film of a laminated film A, the film thus coated is dried in a drying tunnel at temperatures from $80\text{ }^{\circ}\text{C}$ to $180\text{ }^{\circ}\text{C}$, preferably $100\text{ }^{\circ}\text{C}$ to $120\text{ }^{\circ}\text{C}$, a second film is supplied at the end of the drying tunnel and joined to

the first film, then this laminated film is reeled up and the laminating adhesive is finally cured, then a functional layer and/or a functional element is placed between this first laminated film A and a second laminated film B that was produced in the same manner as the laminated film A, and then the laminated film A is laminated to the second laminated film B.

14. Process in accordance with claim 13, **characterized in that** the composite film consists of at least one to N sealable, multi-layered laminated films, wherein N is an integer from 2 to 10.

15. Process in accordance with one of claims 13 or 14, **characterized in that** the second film of the individual laminated films is coated with a thermally activated substance.

16. Process in accordance with one of claims 13 through 14, **characterized in that** the first and the second film of the individual laminated films are identical to or different from one another and are selected from the group consisting of LCP (liquid crystal polymer), polyphenylene sulfide, polyethylene terephthalate, polyethylene naphthalate, polyketone, polyetherketone, polyetheretherketone, polyetherketoneketone, polyetheretherketoneketone, polyetherimide, polyether sulfone, polysulfone, cyclo-olefin copolymer, and polyamide films.

17. Process in accordance with one of claims 13 through 16, **characterized in that** the laminating adhesive is selected from the group consisting of acrylates, polyurethanes, polyester polyols, polyester urethanes, epoxides, copolyesters or natural adhesive resins, which are used as single-component or multi-component systems.

18. Process in accordance with one of the preceding claims 13 through 17, **characterized in that** the wet application weight of the laminating adhesive is 2 g/m² to 40 g/m², preferably 4 g/m² to 10 g/m².

19. Process in accordance with claim 15, **characterized in that** the thermally activated substance is selected from the group consisting of cyclo-olefin copolymers, polyesters, polyurethanes, acrylates and their derivatives, vinyl acetate copolymers, polyvinyl alcohols, polyvinyl butyrals, polyvinyl acetates, sealable maleic resins, alkyd resins, polyolefins, polyamides and saturated, unsaturated, linear and/or branched copolyesters or multi-component polyurethane primer systems.

20. Process in accordance with one of the preceding claims 13 through 19, **characterized in that** the first and second films of the individual laminated films each have a thickness between 10 µm and 100 µm.

21. Use of the laminated film as a cover film and/or protective film for flexible printed conductors, electronic components, sensors.
22. Use of the laminated film for the manufacture of flexible ribbon cables.
23. Use of the composite film for electromagnetic shielding in the composite with an electrically conductive layer, **characterized in that** a metal layer is vacuum deposited, either between the individual laminated films or on the finished composite film.
24. Use in accordance with claim 23, **characterized in that** the vacuum deposited metal layer is made of copper or aluminum.